

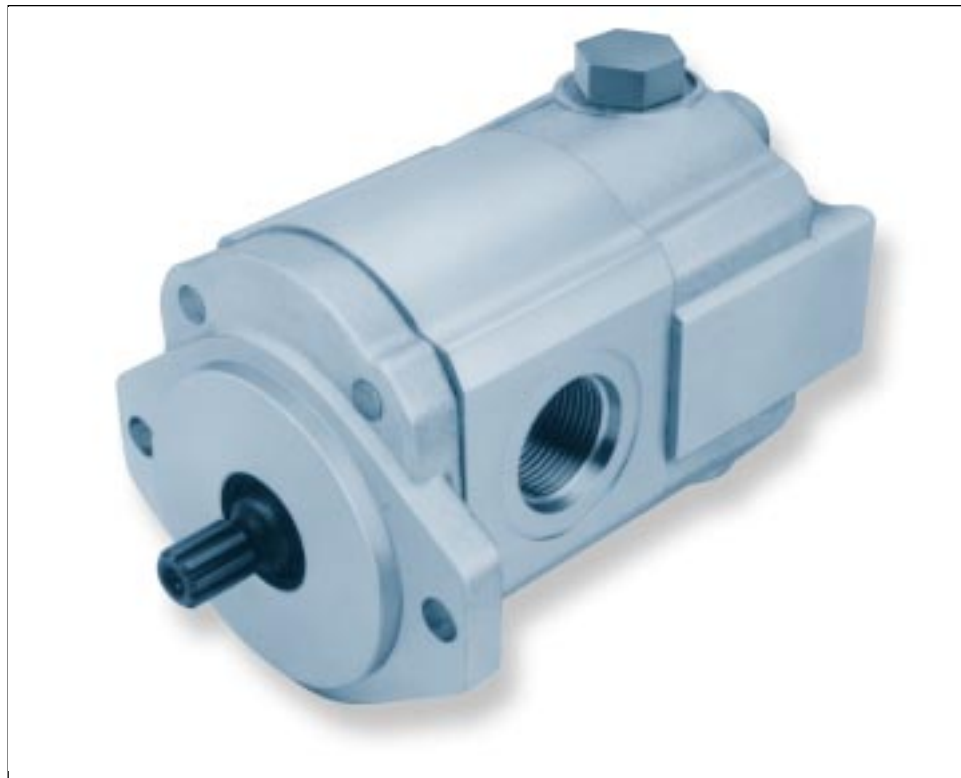
**Haldex**

**Barnes Hydraulics**

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# **W Series Hydraulic Gear Pump & Gear Motor**

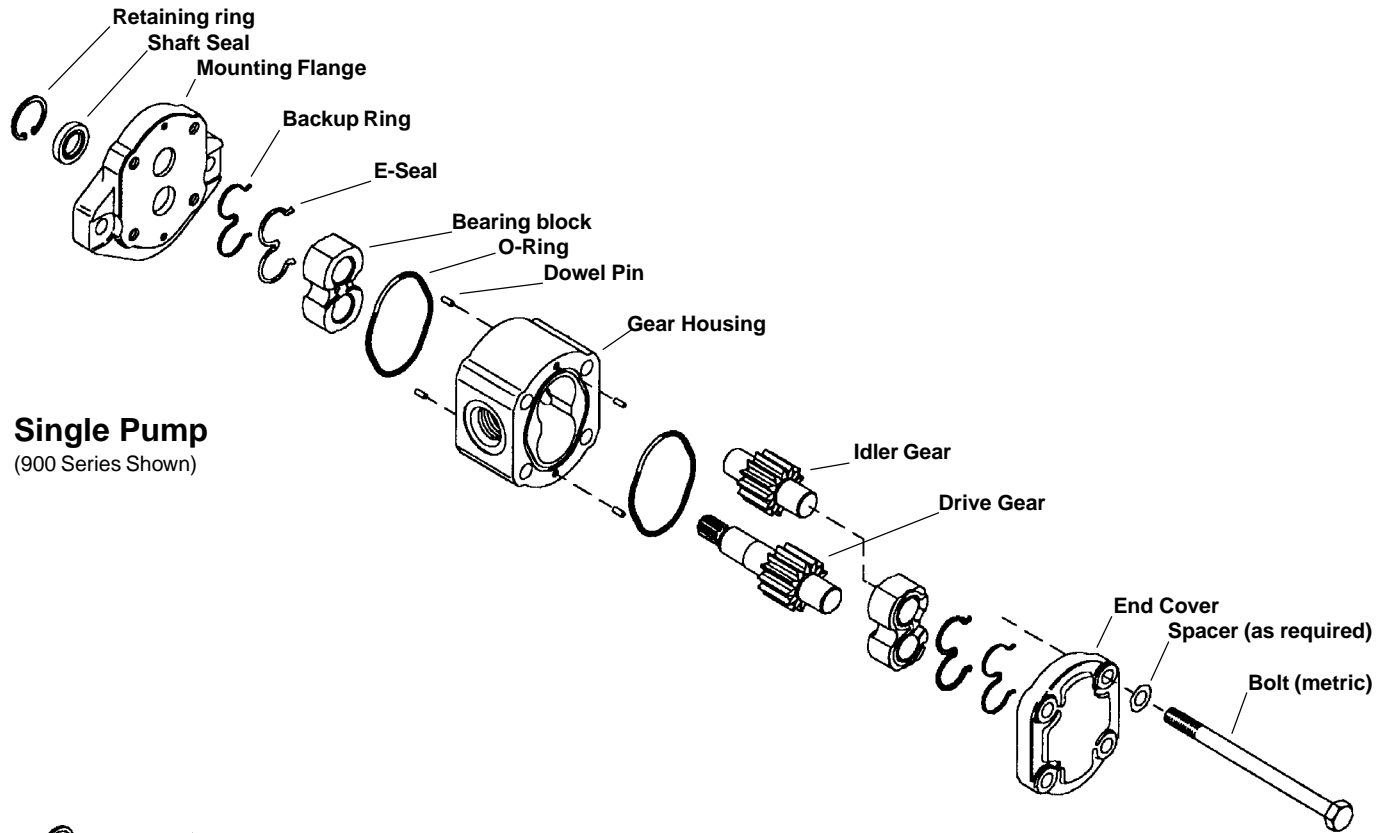
Inspection / Servicing



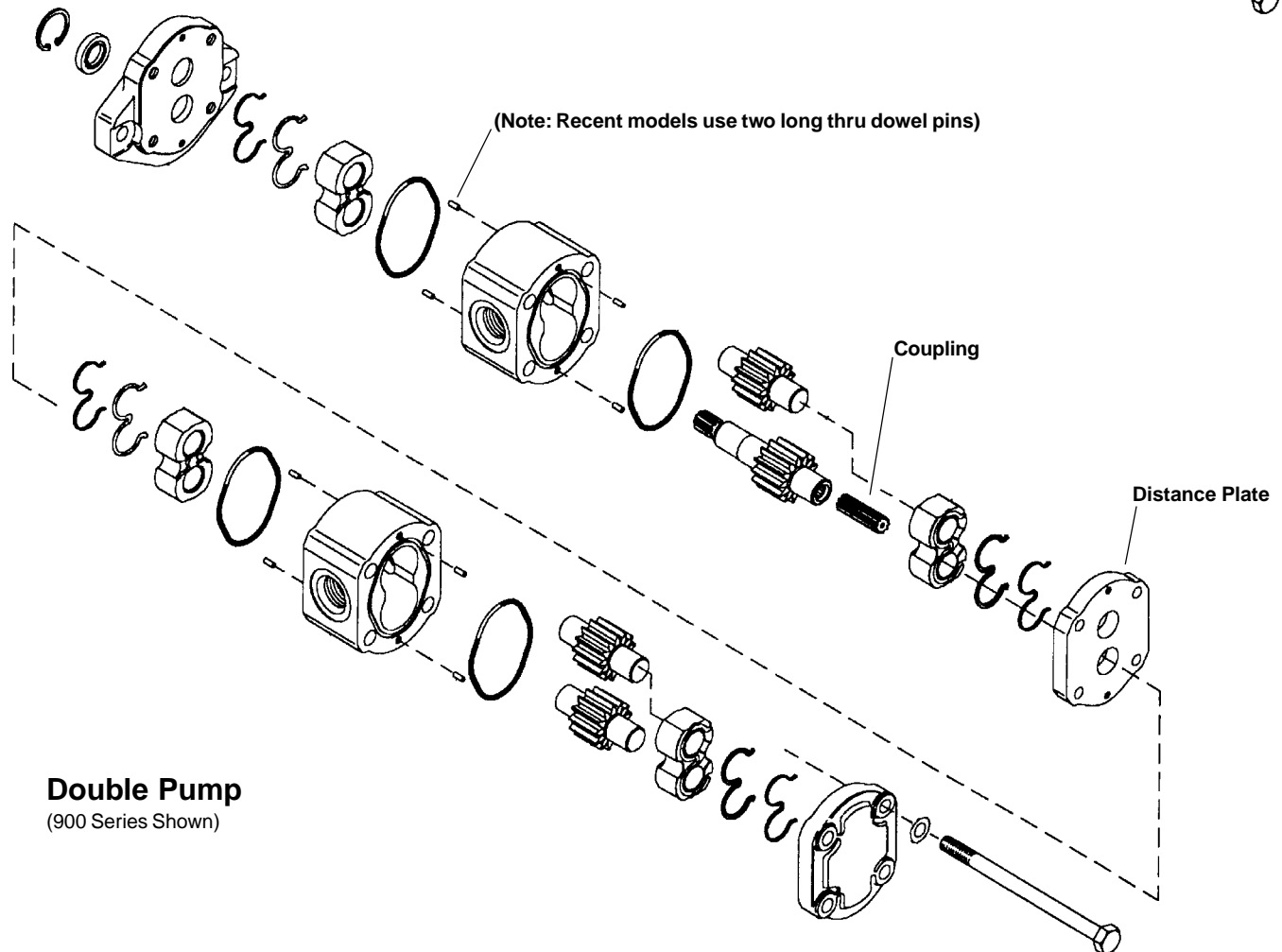
## **Service Manual**

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# W Series Gear Pump



**Single Pump**  
(900 Series Shown)



**Double Pump**  
(900 Series Shown)

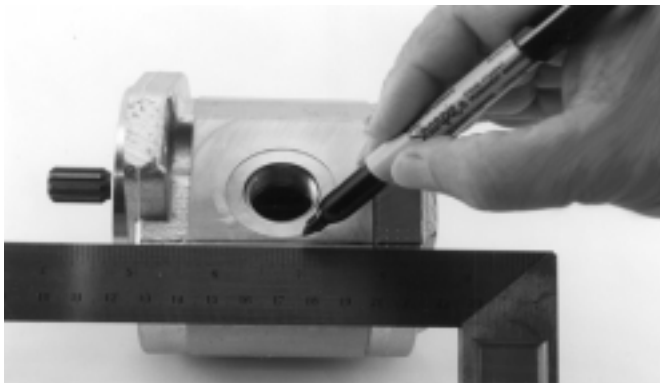
## Tools Required

- Metric Socket Set
- Internal Snap Ring Pliers
- Shaft Seal Sleeve
- Torque Wrench - 100 lb-ft capacity

## Disassembly

**Note: The following general instructions also apply to multiple section gear pumps, the only extra parts are the coupling between the drive shafts and the center distance plate which divides the two pump sections. This repair procedure also applies to the “W” series Gear Motors.**

1. It is very important to work in a clean work area when repairing hydraulic products. Plug ports and wash exterior of pump with a proper cleaning solvent before continuing.
2. Remove port plugs and drain oil from pump.



3. Use a permanent marker pen to mark a line across the mounting flange, gear housing and end cover. This will assure proper reassembly and rotation of pump.
4. Remove key from drive shaft if applicable.



5. Clamp mounting flange in a protected jaw vise with pump shaft facing down.

6. Loosen the four metric hex head bolts.

7. Remove pump from vise and place on clean work bench, remove the four hex head bolts and spacers if applicable.



8. Lift and remove end cover.



9. Carefully remove gear housing and place on work bench. Make sure the rear bearing block remains on the drive and idler shafts.



10. Remove rear bearing block from drive and idler shafts.

## W Series Gear Pump



11. Remove idler shaft from bearing block.



12. Remove drive shaft from mounting flange. There is no need to protect the shaft seal as it will be replaced as a new item.

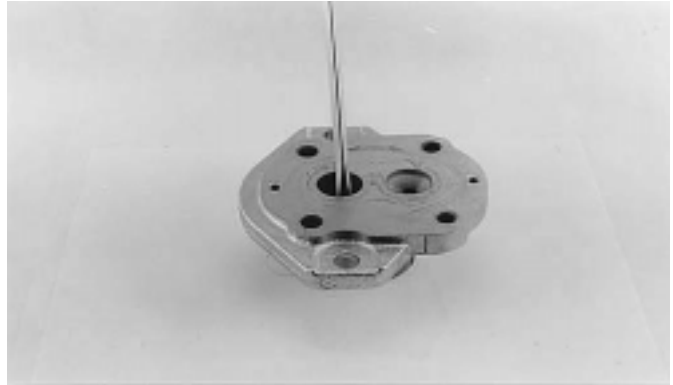


13. Remove the front bearing block.



14. Turn mounting flange over, with shaft seal up, and

remove the retaining ring with proper snap ring pliers.



15. Remove the oil seal from mounting flange, be careful not to mar or scratch the seal bore.

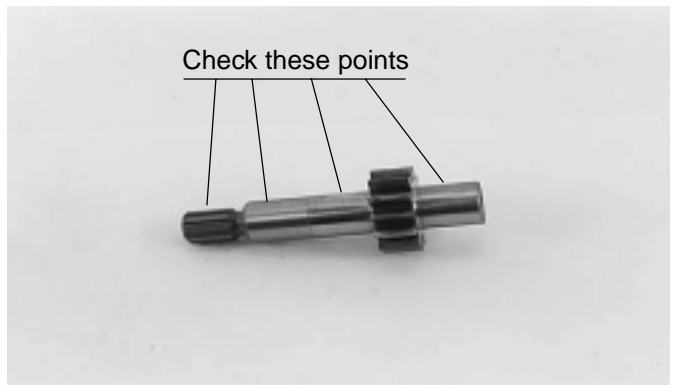
16. Remove the dowel pins from the gear housing. Do not lose pins.



17. Remove seals from both bearing blocks and discard.

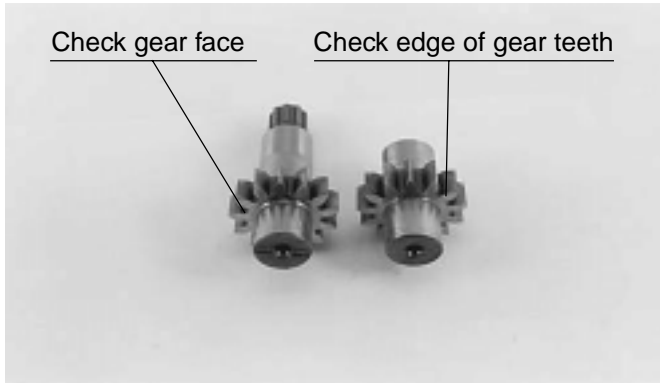
### Inspect Parts For Wear

1. Clean and dry all parts thoroughly prior to inspection. It is not necessary to inspect the seals as they will be replaced as new items.

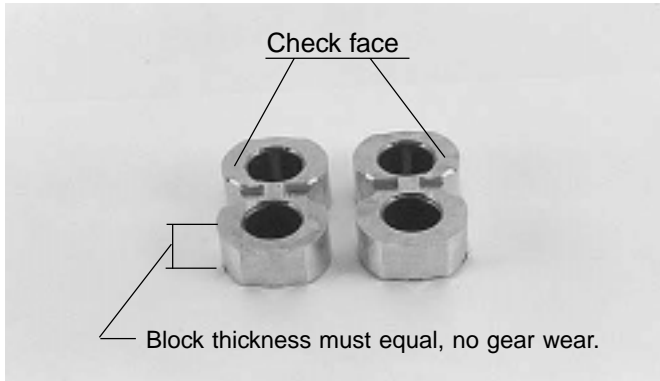


2. Check drive shaft spline for twisted or broken teeth, check keyed drive shaft for broken or chipped keyway. No marks or grooves on shaft in seal area, some discoloration of shaft is allowable.

3. Inspect both the drive gear shaft and idler gear shafts at the bearing points and seal area for rough surfaces and excessive wear.



4. Inspect gear face for scoring or excessive wear. If the face edge of gear teeth are sharp, they will mill into the bearing blocks. If wear has occurred, the parts are unusable.



5. Inspect bearing blocks for excessive wear or scoring on the surfaces which are in contact with the gears. Also inspect the bearings for excessive wear or scoring.

6. Inspect the area inside the gear housing. It is normal for the surface inside the gear housing to show a clean "wipe" on the inside surface on the intake side. There should not be excessive wear or deep scratches and gouges.

### General Information

It is important that the relationship of the mounting flange, bearing blocks and gear housing is correct. Failure to properly assemble this pump will result with little or no flow at rated pressure.

### Reverse Shaft Rotation of Pump

**(Note: This pump is not bi-rotational, if the shaft rotation must be changed the following procedure must be followed.)** Reversing the shaft rotation of the "W" series gear pump may be accomplished by rotating, as a group, the two bearing blocks and the gear housing 180° in relationship to the remaining parts of the pump. This

procedure will place the pressure port on the opposite side of the pump from its original position.

### Reassembly

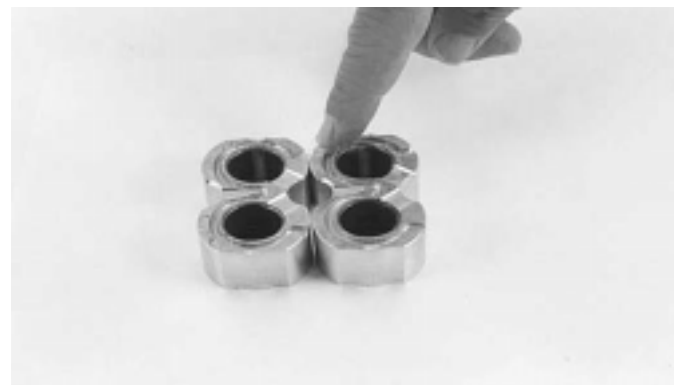
**(Note: New seals should be installed upon reassembly of pump or motor. Refer to page 8 for the necessary kit part numbers for the W-600, W-900 and W-1500 pumps and motors.)**



1. Install new shaft seal in mounting flange with part number side facing outboard. Press the seal into the seal bore until the seal reaches the bottom of the bore. Uniform pressure must be used to prevent misalignment or damage to the seal.



2. Install retaining ring in groove in seal bore of mounting flange.



3. Place front and back bearing blocks on a clean surface with the E-seal grooves facing up. Apply a light coat-

## W Series Gear Pump

ing of petroleum jelly in the grooves. Also coat the E-seal and backup with the petroleum jelly, this will help keep the seals in place during reassembly.



4. Place the E-seals, *flat side outward*, into the grooves in both bearing blocks. Follow by *carefully* placing the backup ring, *flat side outward*, in the groove made by the E-seal and the groove in the bearing block. (**Note: In the W900 series pump, in the center of the backup ring and E-seal there is a notch, make sure that these notches line up so the backup ring will set flush with the E-seal**). The backup ring in the W1500 pump is symmetrical.

5. Place mounting flange, with shaft seal side down, on a clean flat surface.

6. Apply a light coating of petroleum jelly to the exposed face of the front bearing block.



7. Insert the drive end of the drive shaft through the bearing block with the seal side down, and the open side of the E-seal pointing to the intake side of the pump.

8. Install the seal sleeve over the drive shaft and carefully slide the drive shaft through the shaft seal. Remove the seal sleeve from shaft.



9. Install the idler gear shaft in the remaining position in the bearing block. Apply a light coat of clean oil to the face of the drive and idler gears.



10. Pick up the rear bearing block, with seal side up and with open end of the E-seal facing the intake side of the pump, place over the drive and idler gear shafts.

11. Install two dowel pins in the holes in the mounting flange or two long dowel pins through gear housing if pump is a multiple section pump.



12. To install the o-rings in the gear housing, apply a light coating of petroleum jelly in the grooves on both sides of the gear housing. Also coat the new o-rings and install them in the grooves. (*Choose correct size o-ring, refer to instructions on page 9*).



**13.** Gently slide the gear housing over the rear bearing block assembly, slide housing down until the housing engages the dowel pins. Press firmly in place with hands, do not force or use any tool. Check to make sure the intake port in the housing is on the same side as the open end of the E-seal and that the marked lines on the mounting flange and gear housing are in alignment.

**14.** The surface of the rear bearing block should be slightly below the face of the gear housing. If the bearing block sits higher than the rear face of the gear housing then the E-seal or o-ring have shifted out of the groove. If this is the case, remove the gear housing and check for proper seal installation.



**15.** Install the two remaining dowel pins in the rear of the gear housing, if applicable, and place the end cover over the back of the pump .



**16.** Install the four spacers, if applicable, and hex head bolts through the bolt holes in the end cover, hand tighten.



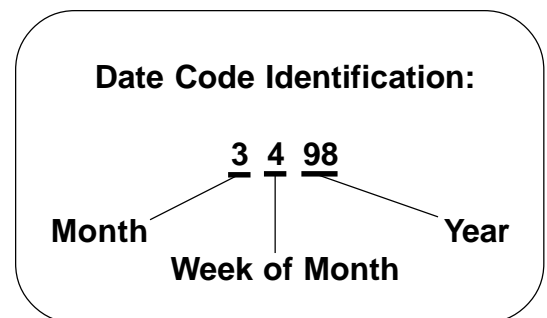
**17.** Place mounting flange of the pump back in the protected jawed vise and alternately torque the bolts to the torque specifications in the torque chart on page 8. All torque figures are for “dry torque” bolts.

**18.** Remove pump from vise.

**19.** Place a small amount of clean oil in the inlet of the pump and rotate the drive shaft away from the inlet one revolution. If the drive shaft binds, disassemble the pump and check for assembly problems, then reassemble the pump.



**20.** The name plate located on the end cover contains the build date code and the model number. Please refer to this information when corresponding with the Haldex Barnes Service Department.



## W Series Gear Pump

### Placing Pump Back Into Service

1. **If shop test stand is available**, the following procedure for testing rebuilt pumps is recommended:

- A. Mount pump on test stand making sure that the proper level of clean oil is available in the reservoir. Check suction line for leaks and obstructions.
- B. Start pump and run for three minutes at zero pressure.
- C. Intermittently load pump to 500 P.S.I. for three minutes.
- D. Intermittently load pump to 1000 P.S.I. for three minutes.
- E. Intermittently load pump to 2000 P.S.I. for three minutes.
- F. Remove pump from test stand and check for freeness of drive shaft. Check pump for signs of external leakage.

2. **If shop test stand is not available**, the following procedure for testing rebuilt pumps is recommended:

- A. **For engine driven pumps**, mount pump on equipment and run pump at 1/2 engine speed at zero pressure for three minutes.
- B. By operating control valve, build pressure intermittently for three minutes.
- C. Increase engine speed to full throttle and build pressure intermittently for three minutes.
- D. Stop engine and check pump for external leaks.
- E. **For electric motor driven pumps**, run pump at little or no load for three minutes, gradually increase load on pump and cycle each succeeding load for three minutes. Check pump for external leaks after break-in test.

### Bolt Torque Chart

PUMP SERIES	THREAD SIZE	TORQUE VALUES, BLACK OXIDE	TORQUE VALUES, ZINC PLATE
W-600	METRIC 8 x 1.25	N/A	228-276 Lb-in / 19-23 lb-ft / 25.8-31.2 N-m
W-900	METRIC 10 x 1.5	600-660 lb-in / 50-55 lb-ft / 68-75 N-m	456-516 lb-in / 38-43 lb-ft / 51.5-58.3 N-m
W-1500	METRIC 12 x 1.75	960-1020 lb-in / 80-85 lb-ft / 108-115 N-m	816-876 lb-in / 68-73 lb-ft / 92.2-99.0 N-m

Bolts and flange threaded hole must be in dry, non-lubricated condition.

### Single or Double Pump Trouble Shooting

PUMP TROUBLE	PROBABLE CAUSE	REMEDY
1. Pump does not develop full pressure.	a. System relief valve set too low or leaking. b. Oil viscosity too low. (oil too thin) c. Pump is worn out. d. Seal Retainer O-ring pinched.	a. Check system relief valve for proper setting. b. Change to proper viscosity oil. c. Repair or replace pump. d. Disassemble pump and check o-ring.
2. Pump will not pump oil.	a. Reservoir low or empty. b. Suction strainer clogged. c. Incorrect shaft rotation.	a. Fill reservoir to proper level. b. Clean suction strainer. c. Check for proper rotation of pump shaft.
3. Noisy pump caused by cavitation.	a. Oil too thick. b. Oil suction filter plugged. c. Suction line plugged or too small.	a. Change to proper viscosity. b. Clean filters. c. Clean line and check for proper size.
4. Oil heating.	a. Oil supply low. b. Contaminated oil. c. Setting of relief valve too high or too low. d. Oil viscosity too low.	a. Fill reservoir to proper level. b. Drain reservoir and refill with clean oil. c. Set to correct pressure. d. Drain reservoir and fill with proper viscosity.
5. Foaming oil.	a. Low oil level. b. Air leaking into suction line. c. Wrong kind of oil.	a. Fill reservoir to proper level. b. Tighten fittings, check condition of line. c. Drain reservoir, fill with non-foaming oil.
6. Shaft seal leakage.	a. Worn shaft seal or cut seal lip. b. Worn shaft in seal area. c. Wrong pump shaft rotation.	a. Replace shaft seal. b. Replace drive shaft and seal. c. Check for proper rotation of pump shaft.

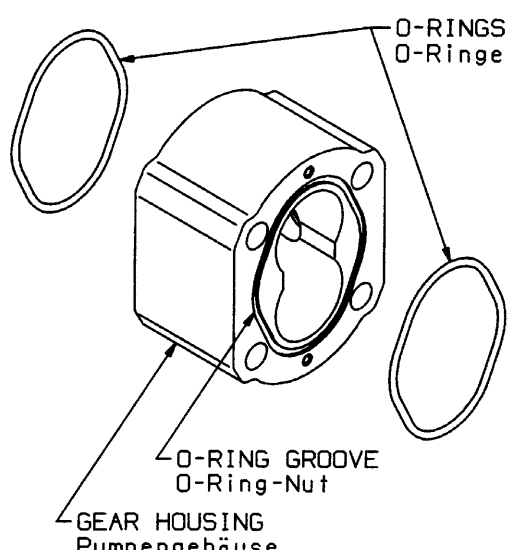
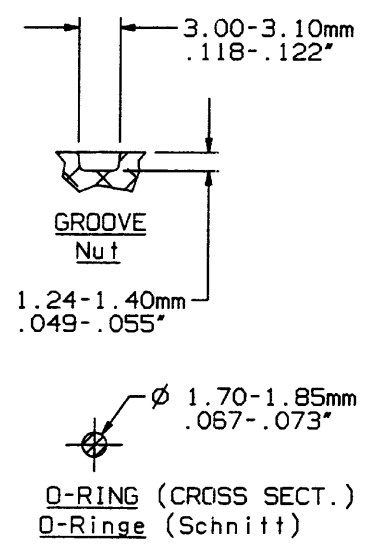
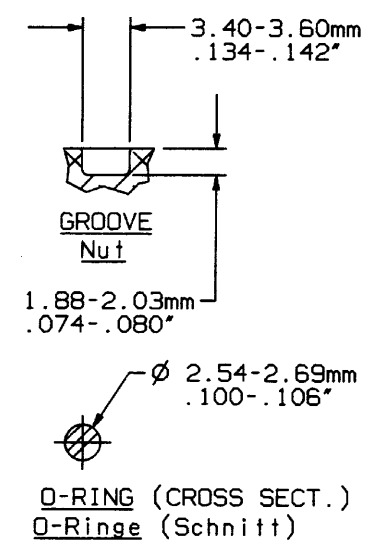


**Pump / Motor Seal Kit Chart**

PUMP/MOTOR DESCRIPTION	W-600 SERIES KIT NUMBER	W-900 SERIES KIT NUMBER	W-1500 SERIES KIT NUMBER	W-1500 SERIES KIT W/ 35MM SHAFT SEAL
SINGLE PUMP	5400042	* 5000100	5200001	5200015
DOUBLE PUMP	5400044	* 5000101	5200002	5200016
TRIPLE PUMP	5400045	* 5000102	5200003	5200017
QUAD PUMP	5400046	* 5000103	5200004	5200018
MOTOR, BI-ROTATIONAL	5400043	* 5000234	5200020	N/A
MOTOR, UNI-DIRECTIONAL	5400047	* 5000233	5200019	N/A

**NOTE: 1500 Series Pumps manufactured from late 1996 use 35mm O.D. shaft seals, 1500 Series Motors are not affected.**

**\* Effective June 1998, kits servicing the W-900 Series Pumps will contain two different size o-rings for between housing and end plates, refer to drawing below for instructions.**

<u>IMPORTANT NOTICE</u>	<u>Wichtiger Hinweis</u>	
<p>THIS KIT CONTAINS O-RINGS OF TWO SIZES FOR SEALING GEAR HOUSINGS. EACH GEAR HOUSING CONTAINS TWO IDENTICAL O-RING GROOVES. MEASURE GROOVE DIMENSIONS AS INDICATED BELOW TO DETERMINE APPROPRIATE O-RING SIZES TO BE USED. VIEWS ARE NOT ACTUAL SIZE.</p>	<p>Dieser Dichtsatz enthaelt O-Ringe in zwei verschiedenen Groessen zur Abdichtung der Pumpengehaeuse. Das Pumpengehaeuse hat zwei identische O-Ring-Nuten. Ermitteln Sie die Nutabmessungen (siehe Abbildungen), um den passenden O-Ring auszuwaehlen. Abbildung nicht maestaeblich.</p>	
	 <p>GROOVE Nut</p> <p>1.24-1.40mm .049-.055"</p> <p>3.00-3.10mm .118-.122"</p> <p>Ø 1.70-1.85mm .067-.073"</p> <p>O-RING (CROSS SECT.) O-Ringe (Schnitt)</p>	 <p>GROOVE Nut</p> <p>1.88-2.03mm .074-.080"</p> <p>3.40-3.60mm .134-.142"</p> <p>Ø 2.54-2.69mm .100-.106"</p> <p>O-RING (CROSS SECT.) O-Ringe (Schnitt)</p>

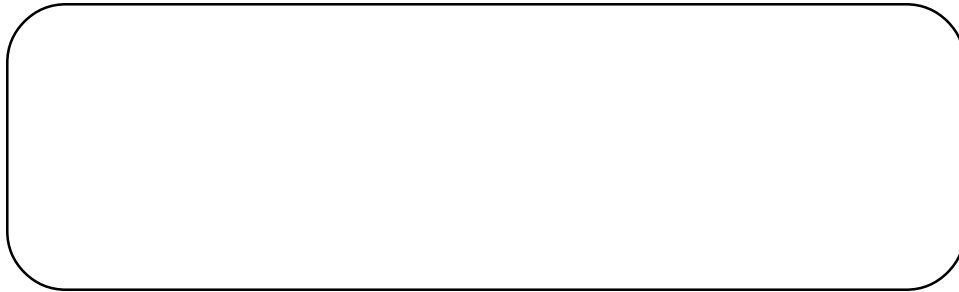
**NOTES**

**NOTES**

## W Series Gear Pump

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### AUTHORIZED DISTRIBUTOR



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